

REMARKS

Claims 1-23 are rejected under 35 USC §102(e) as being anticipated by Ferguson et al. (US Patent No. 6,798,777).

Applicants traverse the 35 USC §102(e) rejections of claims 1-23. Claims 1-23 remain pending.

35 USC §102 Rejections

Claims 1-23 stand rejected under 35 USC §102(e) as allegedly anticipated by Ferguson. Applicants respectfully traverse this rejection with respect to pending claims 1-23.

A proper rejection under 35 USC §102 requires that a single reference teach each and every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. See M.P.E.P. §2131. Ferguson does not disclose each and every feature recited in claims 1-23.

On page 4 of the Office Action, the Examiner alleges that claims 1-5, 6-8, and 9-12 are essentially the method of the device of claims 13-18. The Examiner then rejects claims 1-5, 6-8 and 9-12 under the same rationale as was used to reject claims 13-18. Applicants respectfully point out that independent claims 1, 6 and 9 recite features not found in claims 13-18. For example, claim 1 recites storing first context state information for the first data and storing second context state information for the second data. These features are not recited in claims 13-18 and are not addressed in the Office Action. Therefore, a prima facie case of anticipation has not been established with respect to claim 1. Claim 6 recites processing a second data related to routing of a second packet while waiting for the requested first information to arrive. This

feature is not recited in claims 13-18 and is not addressed in the Office Action. Therefore a prima facie case of anticipation has not been established with respect to claim 6. Claim 9 recites sending the data structures to a plurality of processing engines, where each data structure corresponds to a different packet of information. This feature is not recited in claims 13-18 and is not addressed in the Office Action. Therefore a prima facie case of anticipation has not been established with respect to claim 9. Therefore, the 35 USC §102(e) rejection of claims 1, 6 and 9 is improper. Furthermore, the 35 USC §102(e) rejection of claims 2-5, 7-8, and 10-12 which depend from claims 1, 6 and 9 is also improper.

Nonetheless, claim 1 is directed to a method of performing route lookups for a group of data that includes processing, by a processor, a first data to generate routing information until first information is needed; requesting the first information; storing first context state information for the first data; processing, by the processor, a second data to generate routing information until second information is needed; requesting the second information; storing second context state information for the second data; and resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received. Ferguson does not disclose at least one of these features.

For example, Ferguson does not disclose processing, by a processor, a first data to generate routing information until first information is needed; requesting the first information; storing first context state information for the first data; processing, by the processor, a second data to generate routing information until second information is needed; storing second context state information for the second data; and resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received, as

required by claim 1. The Examiner alleges that the features of claim 1 are taught by Ferguson as claim 1 is allegedly the method of the device in claims 13-18 (Office Action, page 4). In addressing claim 13, the Examiner alleges that Ferguson teaches the features of claim 13 at Fig. 2B, col. 5, line 61 to col. 6, line 13; Fig. 9, col. 14, lines 8-27; and Fig. 11, result processor 1506 (Office Action, page 2). Neither of these sections of Ferguson nor any other section of Ferguson discloses the above features of claim 1.

Col. 5, line 61 to col. 6, line 13 of Ferguson recites:

Referring to FIG. 2B, each router 20 includes an input switch 100, an output switch 102, a global data buffer 104 including one or more memory banks 105, a controller 106 and a plurality of multi-function multiports 150 (150-0 through 150-3), respectively. Associated with the controller 106 is a controller memory 109 for storing routing information. Input switch 100 and output switch 102 are connected to each multi-function multiport 150 in router 20. In one implementation, router 20 includes plug-and-play multi-function multiports which allow for easy expansion capability. The present invention will be described with reference to a system including eight multi-function multiports 150 (even though FIG. 2B only shows four), with each multi-function multiport including up to sixteen input ports and sixteen output ports. Other configurations may be used depending on user load conditions. Each multi-function multiport includes one or more input ports, one or more output ports and a memory. The configuration and operation of the multi-function multiports will be described in greater detail below.

This portion of Ferguson, which corresponds to Fig. 2B, discusses a router that includes multifunction multiports to facilitate expansion of the router. This portion of Ferguson does not disclose processing, by a processor, a first data to generate routing information until first information is needed; requesting the first information; storing first context state information for the first data; processing, by the processor, a second data to generate routing information until second information is needed; storing second context state information for the second data; and resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received, as required by claim 1.

Col. 14, lines 8-27 of Ferguson recites:

Referring now to FIG. 9, each route lookup engine 110 includes a key buffer 902, a result buffer 904, a key engine 905, one or more specialized engines for processing packets 906, a current key pointer 908 and starting hop table 910. In one implementation, each route lookup engine 10 includes a general purpose key engine 905 and plural specialized engines 906. The general purpose key engine 905 receives the key from the input switch, loads the key and result buffers, performs initializations, unloads the buffers and performs other operations in support of the lookup process. Specialized engines operate on instructions or data structures stored in memory 920 to perform a particular function. Functions can be selected from lookup operations, filtering, policing, management or other functions. In one implementation, the specialized engines can be selected from the group of a firewall engine 906a, a policing engine 906b, index engine 906c and trie search engine 906d. Each of these engines can be invoked to perform an operation and assist in determining a forwarding decision for a packet. As will be described below, more than one engine can be invoked to operate on each packet.

This portion of Ferguson, which describes Fig. 9, discusses specialized engines that are used to perform functions that can be selected from lookup operations, filtering, policing, management or other functions. This portion of Ferguson does not disclose processing, by a processor, a first data to generate routing information until first information is needed; requesting the first information; storing first context state information for the first data; processing, by the processor, a second data to generate routing information until second information is needed; storing second context state information for the second data; and resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received, as required by claim 1.

The result processor of Fig. 11 is discussed at col. 41, lines 2-11.

Col. 41, lines 2-11 of Ferguson recites:

Output switch 102 receives notification from controller 106 on controller interface 1505. Result processor 1506 decodes the result (route) and determines which multi-function multiport(s) 150 is (are) to receive the route data. Based on the mask in the notification, result processor 1506 transfers the notification to output processor 1508 for transfer to

each multi-function multiport 150 indicated. At each cell slot, output processor 1508 provides (via outputs 1504) a notification cell to each multi-function multiport 150.

The result processor of Ferguson decodes results, determines multi-function multiports that are to receive route data and transfers notifications to an output processor. Ferguson does not disclose that the result processor 1506 processes, by a processor, a first data to generate routing information until first information is needed; requesting the first information; storing first context state information for the first data; processing, by the processor, a second data to generate routing information until second information is needed; storing second context state information for the second data; and resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received, as required by claim 1.

Since Ferguson does not disclose the combination of features recited in claim 1, the 35 USC §102(e) rejection of claim 1 is improper. Applicants respectfully request that the rejection of claim 1 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claims 2-5 depend from claim 1 and are allowable for at least the reasons argued in connection with claim 1. Applicants respectfully request that the rejection of claims 2-5 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claim 6 recites features similar to features described above with respect to claim 1. Therefore, claim 6 is not anticipated by Ferguson for at least reasons similar to reasons given above with respect to claim 1.

Claims 7 and 8 depend from claim 6 and are allowable for at least the reasons argued in connection with claim 6. Applicants respectfully request that the rejection of claims 7 and 8

under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claim 9 is directed to a method for routing packets of information using corresponding data structures, that includes receiving a group of data structures related to the packets of information; sending the data structures to a group of processing engines, where each data structure corresponds to a different packet of information; performing, at each processing engine, concurrent route lookups for at least two of the data structures at a time; and modifying the data structures based on the route lookups; and routing the packets of information based on the modified data structure. Ferguson does not disclose at least one of these features.

For example, Ferguson does not disclose performing, at each processing engine, concurrent route lookups for at least two of the data structures at a time, as required by claim 9. Ferguson discloses performing a single lookup where the lookup includes multiple distinct operations (col. 2, lines 28-32). Ferguson does not disclose performing, at each processing engine, concurrent route lookups for at least two of the data structures at a time. For at least these reasons, Ferguson does not disclose at least this feature of claim 9.

Since Ferguson does not disclose the combination of features recited in claim 9, the 35 USC §102(e) rejection of claim 9 is improper. Applicants respectfully request that the rejection of claim 9 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claims 10-12 depend from claim 9 and are allowable for at least the reasons argued in connection with claim 9. Applicants respectfully request that the rejection of claims 10-12 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claim 13 is directed to a network device that includes an input portion configured to receive data structures and to transmit data items associated with the data structures; a group of

processing engines, each processing engine being configured to receive a group of data items from the input portion and to contemporaneously compute routes for the group of data items; a resource configured to receive requests from the group of processing engines; and a result processor configured to modify the data structures based on the routes computed by the group of processing engines. Ferguson does not disclose at least one of these features.

For example, Ferguson does not disclose a group of processing engines, each processing engine being configured to receive a group of data items from the input portion and to contemporaneously compute routes for the group of data items, as required by claim 13. The Examiner alleges that Fig. 9 and col. 14, lines 8-27 of Ferguson disclose this feature (Office Action, page 2). As discussed in connection with claim 1, above, this portion of Ferguson discloses specialized engines that are used to perform functions that can be selected from lookup operations, filtering, policing, management or other functions. This portion of Ferguson is silent with respect to a group of processing engines, where each processing engine is configured to receive a group of data items from the input portion and to contemporaneously compute routes for the group of data items.

Moreover, Ferguson does not disclose a result processor configured to modify the data structures based on the routes computed by the group of processing engines, as further required by claim 13. The Examiner alleges that Ferguson's result processor 1506 is equivalent to the result processor of claim 13. Ferguson discusses result processor 1506 at col. 41, lines 2-11. As previously discussed, the result processor of Ferguson decodes results, determines multi-function multiports that are to receive route data and transfers notifications to an output processor. Ferguson does not disclose that result processor 1506 modifies data structures based on the

routes computed by the group of processing engines, as required by claim 13.

Since Ferguson does not disclose the combination of features recited in claim 13, the 35 USC §102(e) rejection of claim 13 is improper. Applicants respectfully request that the rejection of claim 13 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claims 14-18 depend from claim 13. Therefore, claims 14-18 are patentable over Ferguson for at least the reasons given above with respect to claim 13. Reconsideration and allowance of claims 14-18 are respectfully requested. Moreover, these claims recite additional features not disclosed by Ferguson.

Dependent claim 16 is directed to a network device wherein each of the group of processing engines includes a data processor configured to calculate a route for one key at a time, a functional control state machine configured to control operation of the data processor, and wherein the context buffer stores a partially calculated route from the data processor and a processing state from the functional control state machine. Ferguson does not disclose at least one of these features.

For example, Ferguson does not disclose a context buffer that stores a partially calculated route from the data processor and a processing state from the functional control state machine, as required by claim 16. The Examiner alleges that Ferguson discloses this feature at col. 14, lines 28-46 (Office Action, page 3).

Col. 14, lines 28-46 of Ferguson recites:

Key engine 905 stores the fields from a packet that have been selected to be part of the key for packet processing in key buffer 902. Any part of a packet can be selected to be part of the key, depending on the application. The key extraction process is completed in the input switch 102 as described above. The results of the key extraction process (the extracted key) and other information forms the notification that is passed to the controller 106. Any part of the notification can be extracted by the key engine 905 and written to

the key buffer 902. A 'key' can consist of two parts. In one implementation, the first eight bytes of the key are constructed either from the contents of the notification for the packet, or built from intermediate results of route lookups. The remaining bytes of the key, which are variable in length up to 41 bytes, are those extracted from the payload of the packet. In one implementation, key buffer 902 is a 64 byte buffer, physically located in the first 8 double words in the key engine's memory (not shown). Fixed data is stored in bytes 0-7 of the buffer while the variable key data is stored in bytes 8 and beyond.

This portion of Ferguson discloses the operation of a key engine that operates on portions of packets to form keys made up of information extracted from the packets. Contrary to the Examiner's interpretation, this portion of Ferguson does not disclose a context buffer that is configured to store a partially calculated route from the data processor and a processing state from the functional control state machine. In fact, Ferguson does not mention context buffers or functional control state machines anywhere in its disclosure. For at least these reasons, Ferguson does not disclose the features of claim 16.

Since Ferguson does not disclose the combination of features recited in claim 16, the 35 USC §102(e) rejection of claim 16 is improper. Applicants respectfully request that the rejection of claim 16 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Dependent claim 17 is directed to a group of processing engines that further includes a context switch controller that is configured to cause the data processor and the functional control state machine to respectively store the partially calculated route and the processing state in the context buffer when the data processor requests data from the memory. Ferguson does not disclose the above feature of claim 17.

The Examiner relies on col. 13, lines 4-67 of Ferguson for disclosing the feature of claim 17 (Office Action, page 3). Contrary to the Examiner's interpretation, this portion of Ferguson discusses extracting portions of incoming packets to form keys, the types of information that can

be used in keys, using keys in association with router lookup, and data structures that are used for result notifications. Col. 13, lines 4-67 of Ferguson does not disclose a context switch controller that is configured to cause the data processor and the functional control state machine to respectively store the partially calculated route and the processing state in the context buffer when the data processor requests data from the memory, as required by claim 17.

Since Ferguson does not disclose the combination of features recited in claim 17, the 35 USC §102(e) rejection of claim 17 is improper. Applicants respectfully request that the rejection of claim 17 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

On page 4 of the Office Action, the Examiner alleges that claims 19-22 and 23 are essentially the underlying system of the device of claims 13-18. The Examiner then rejects claims 19-22 and 23 under the same rationale as was used to reject claims 13-18. Applicants respectfully point out that independent claim 23 recites features not found in claims 13-18. Claim 23 recites means for storing intermediate products from the means for processing while waiting for requested information. This feature is not recited in claims 13-18 and is not addressed in the Office Action. Therefore a prima facie case of anticipation has not been established with respect to claim 23.

Nonetheless, claim 19 is directed to a system for performing route lookups for processing a group of data items, that include a data processing portion configured to process one data item at a time and to request data when needed; a buffer configured to store a partial result from the data processing portion; and a controller configured to load the partial result from the data processing portion into the buffer and to input another data item into the data processing portion for processing while requested data is obtained for a prior data item. Ferguson does not disclose

at least one of these features.

For example, Ferguson does not disclose a controller configured to load the partial result from the data processing portion into the buffer and to input another data item into the data processing portion for processing while requested data is obtained for a prior data item, as required by claim 19. Ferguson is silent with respect to this feature.

Since Ferguson does not disclose the combination of features recited in claim 19, the 35 USC §102(e) rejection of claim 19 is improper. Applicants respectfully request that the rejection of claim 19 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn. Claims 20-22 depend from claim 19 and are allowable for at least the reasons argued above in connection with claim 19. Applicants respectfully request that the rejection of claims 20-22 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

Claim 23 recites features similar to features recited above with respect to claim 19. Therefore, claim 23 is not anticipated by Ferguson for at least reasons similar to reasons given above with respect to claim 19. Applicants respectfully request that the rejection of claim 23 under 35 USC §102(e) based on Ferguson be reconsidered and withdrawn.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

HARRITY & SNYDER, L.L.P.



By: _____
James K. Weixel
Registration No. 44,399

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11240 Waples Mill Road
Suite 300
Fairfax, Virginia 22030
(571) 432-0800